

provided suitable habitats for completion of the parasite's life cycle.

Prevalence of infection was 0% at 22 localities, but it ranged from 5.6% to 100% at 23 localities (Table 1). Significant among high prevalence localities was a roadside swamp near Milam, Texas, where all of 18 crayfish were infected. Because worms are long, slender, and fragile, they are difficult to remove intact. Therefore, no attempt was made to determine intensity of infection. However, the Milam crayfish had relatively higher estimated intensities (≥ 10 worms per antennal gland) than those from lower prevalence localities, where estimated worm burdens usually ranged from 1 to 5 per infected gland.

Hobbs and Hobbs (1990) believed *P. acutus* to be a species complex and that over its range, certain populations, previously identified as *P. acutus*, were in fact new species. One such species was *P. zonangulus*, which was described from specimens collected in Hardin, Jefferson, and Orange counties in southeastern Texas (Hobbs and Hobbs, 1990). Although none of my collecting sites were within those 3 counties, *P. zonangulus* was not collected from sites in Newton County, Texas, nor from Calcasieu Parish, Louisiana, both of which border the region where *P. zonangulus* reportedly occurs.

In light of the apparent host specificity exhibited by *A. caridicola*, further research is warranted to determine whether *P. zonangulus* harbors this infection.

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Literature Cited

- Brown, C. A.** 1972. Wildflowers of Louisiana and adjoining states. Louisiana State University Press, Baton Rouge. 247 pp.
- Corkum, K. C., and H. M. Turner.** 1977. *Alloglossoides caridicola* gen. et sp. n. (Trematoda: Macrorodroididae) from a Louisiana crayfish. Proceedings of the Helminthological Society of Washington 44:176–178.
- Hobbs, H. H., Jr.** 1972. Crayfish (Astacidae) of North and Middle America: Biota of freshwater ecosystems, U.S. Environmental Protection Agency Water Pollution Control Research Series Identification Manual 9. 173 pp.
- . 1981. The Crayfish of Georgia. Smithsonian Contributions to Zoology 318. 549 pp.
- , and **H. H. Hobbs III.** 1990. A new crayfish (Decapoda: Cambaridae) from southeastern Texas. Proceedings of the Biological Society of Washington 103:608–613.
- Penn, G. H.** 1959. An illustrated key to the crawfish of Louisiana with a summary of their distribution within the state (Decapoda: Astacidae). Tulane Studies in Zoology 7:3–20.

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Research Note

Nematodes of Two Skinks, *Ctenotus leonhardii* and *Ctenotus quattuordecimlineatus* (Sauria: Scincidae), from Western Australia

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ABSTRACT: Thirty-one *Ctenotus leonhardii* and 30 *C. quattuordecimlineatus* from Western Australia were examined for helminths. *Ctenotus leonhardii* harbored the nematodes *Maxvachonia chabaudi* and *Abbreviata* sp. (larvae), and *C. quattuordecimlineatus* harbored the nematodes *M. chabaudi*, *Parapharyngodon kar-*

tana, *Physalopteroides filicauda*, *Wanaristrongylus ctenoti*, and *Abbreviata* sp. (larvae). Highest prevalence (30%) was recorded for *Abbreviata* sp. in *C. quattuordecimlineatus*, and greatest mean intensity (3.5) was recorded for *Abbreviata* sp. in *C. leonhardii*. *Ctenotus leonhardii* represents a new host record for *M. chabaudi* and *Abbreviata* sp. *Ctenotus quattuordecimlineatus* represents a new host record for *M. chabaudi* and *P. kartana*.

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KEY WORDS: *Ctenotus leonhardii*, *Ctenotus quattuordecimlineatus*, Scincidae, Western Australia, *Maxvachonia chabaudi*, *Parapharyngodon kartana*, *Physalopteroides filicauda*, *Wanaristrongylus ctenoti*, *Abbreviata* sp.

Ctenotus leonhardii (Sternfeld, 1919) occurs from the central coast of Western Australia through the southern Northern Territory and northern South Australia to Queensland and New South Wales; *C. quattuordecimlineatus* (Sternfeld, 1919) occurs from central Western Australia through adjacent regions of northwestern South Australia and southwestern Northern Territory (Cogger, 1992). There are no previous reports of nematodes from *C. leonhardii*; there is 1 report (Jones, 1995a) from *C. quattuordecimlineatus*. The purpose of this note is to report intestinal nematodes from *C. leonhardii* and *C. quattuordecimlineatus* from Western Australia.

Thirty-one *C. leonhardii* (17 females, 14 males; mean \pm SD snout-vent length [SVL] = 67.8 ± 6.5 mm, range = 56–79 mm) and 30 *C. quattuordecimlineatus* (16 females, 14 males; SVL = 59.3 ± 4.5 mm, range = 52–72 mm) were borrowed from the herpetology collection of the Natural History Museum of Los Angeles County and examined for helminths. The *C. leonhardii* specimens were collected between 1966 and 1967, 29 km S of Atley homestead, (28°27'S, 119°05'E), Western Australia; *C. quattuordecimlineatus* specimens were collected in 1967, 10 from 29 km S of Neale Junction (28°30'S, 125°50'E) and 20 from 38 km E of Laverton (28°28'S, 112°50'E). All lizards were mature. The Natural History Museum of Los Angeles County accession numbers for the hosts that we examined are as follows: *C. leonhardii*: 55862, 55864, 55866, 55869, 55871, 55876, 55878, 55879, 55882, 55884, 55886, 55888, 55890, 55892, 55893, 55895, 55896, 55900, 55902, 55903, 55906, 55908–55912, 55914, 55915, 55918, 55925, 55927; *C. quattuordecimlineatus*: 56087, 56089, 56091–56093, 56097, 56098, 56111, 56112, 56121, 56124, 56126, 56128, 56130–56133, 56135, 56136, 56139, 56140, 56142, 56145–56147, 56150, 56151, 56154, 56156. These specimens had been collected for use in an ecological study (Pianka, 1969) and they were originally fixed in 10% formalin and preserved in ethanol. Because the ecological study included stomach analysis, only small and large intestines remained with the car-

casses; however, 4 pyloric stomach regions were present in the *C. leonhardii* sample and 2 were present in the *C. quattuordecimlineatus* sample. The portions of stomach, small intestine, large intestine, and body cavity were examined with a dissecting microscope. Nematodes were removed and identified using the standard glycerol wet mount procedure. Terminology usage is in accordance with Bush et al. (1997).

Ctenotus leonhardii harbored 2 species of nematodes: *Maxvachonia chabaudi* Mawson, 1972 and *Abbreviata* sp. (third stage larvae only). The lizard is a new host record for these nematodes. *Ctenotus quattuordecimlineatus* harbored 5 species of nematodes: *M. chabaudi*, *Parapharyngodon kartana* (Johnston and Mawson, 1941), *Physalopteroides filicauda* Jones, 1985, *Wanaristrongylus ctenoti* Jones, 1987, and *Abbreviata* sp. (third stage larvae only). This lizard is a new host record for *M. chabaudi* and *P. kartana*. Selected nematodes were deposited in the United States National Parasite Collection (USNPC) with the following accession numbers: *M. chabaudi* from *C. leonhardii*, USNPC 87615; *Abbreviata* sp. from *C. leonhardii*, USNPC 87616; *M. chabaudi* from *C. quattuordecimlineatus*, USNPC 87617; *P. kartana* from *C. quattuordecimlineatus*, USNPC 87618; *Abbreviata* sp. from *C. quattuordecimlineatus*, USNPC 87619; *P. filicauda* from *C. quattuordecimlineatus*, USNPC 87620. Prevalence, mean intensity, mean abundance, and sites of infection are given in Table 1. There was no significant difference for prevalence of infection (percentage of lizards infected) between *C. leonhardii* and *C. quattuordecimlineatus* for *M. chabaudi* or *Abbreviata* sp. ($\chi^2 = 1.02$ and 1.72, respectively, 1 df, $P > 0.05$). Too few individuals of the other helminth species were found to permit statistical analysis.

With the exception of *P. kartana*, the other 4 helminth species found in this study have previously been reported from species of *Ctenotus*. *Maxvachonia chabaudi* was found in *C. australis*, *C. labillardieri*, *C. leae*, and *C. regius* (Mawson, 1972; Goldberg and Bursey, 1995); *P. filicauda* was found in *C. calurus*, *C. dux*, *C. grandis*, *C. helenae*, *C. pantherinus*, *C. quattuordecimlineatus*, and *C. schomburgkii* (Jones, 1995a); *W. ctenoti* was found in *C. ariadnae*, *C. calurus*, *C. dux*, *C. grandis*, *C. helenae*, *C. pantherinus*, *C. quattuordecimlineatus*, and *C. schomburgkii* (Jones, 1987, 1995a); and *Abbrev-*

Table 1. Nematodes from *Ctenotus leonhardii* (n = 31) and *C. quattuordecimlineatus* (n = 30) from Western Australia.

Host Nematode	Prevalence (%)	Intensity		Abundance ($\bar{x} \pm SD$)	Site
		$\bar{x} \pm SD$	Range		
<i>Ctenotus leonhardii</i>					
<i>Maxvachonia chabaudi</i> *	26	3.3 \pm 2.0	1–6	0.84 \pm 1.73	stomach, intestines
<i>Abbreviata</i> sp. (encysted larvae)*	13	3.5 \pm 1.7	2–6	0.45 \pm 1.31	gastric peritoneum
<i>Ctenotus quattuordecimlineatus</i>					
<i>Maxvachonia chabaudi</i> *	13	3.3 \pm 2.1	1–6	0.43 \pm 1.31	stomach, intestines
<i>Parapharyngodon kartana</i> *	10	2.7 \pm 1.5	1–4	0.27 \pm 0.91	intestines
<i>Physalopteroides filicauda</i>	3	1.0		0.03 \pm 0.18	stomach
<i>Wanaristrongylus ctenoti</i>	7	1.0		0.07 \pm 0.25	stomach, small intestine
<i>Abbreviata</i> sp. (encysted larvae)	30	1.7 \pm 1.0	1–4	0.50 \pm 0.94	gastric peritoneum

* New host record.

iata sp. larvae was found in *C. regius* and *C. schomburgkii* (Goldberg and Bursey, 1995). In addition, cysts containing larvae of physalopterid nematodes (possibly *Abbreviata* sp.) were found in *C. calurus*, *C. dux*, *C. grandis*, *C. helenae*, *C. pantherinus*, *C. quattuordecimlineatus*, and *C. schomburgkii* (Jones, 1995a).

The 5 helminth species reported have also occurred in other reptile genera. *Maxvachonia chabaudi* was found in Australia in the scincids *Egernia*, *Eulamprus*, *Hemiergis*, *Lerista*, and *Morethia*, in a gekkonid, *Phyllurus*, and in an elapid snake, *Pseudonaja* (Baker, 1987). *Parapharyngodon kartana* was originally described from the Australian skink, *Hemiergis peronii*, as *Thelandros kartana* Johnston and Mawson, 1941 but was moved to the genus *Parapharyngodon* by Adamson (1981). It is known in Australia from the agamid *Amphibolurus*, a gekko *Christinus*, and the scincids *Hemiergis*, *Lerista*, and *Lygosoma* (Baker, 1987) and from Samoa from the scincid *Emoia* (Goldberg and Bursey, 1991). *Physalopteroides filicauda* has been reported in Australia from the agamids *Ctenophorus*, *Lophognathus*, and *Pogona*, from the scincids *Cryptoblepharus*, *Egernia*, and *Lerista*, from a varanid *Varanus*, and from the gekkonids *Diplodactylus*, *Gehyra*, and *Nephruirus* (Jones, 1986, 1987, 1995a). *Wanaristrongylus ctenoti* has been reported in Australia from the scincid *Egernia*, from an agamid *Ctenophorus*, and from the gekkonid *Nephruirus* (Jones, 1995a). Larvae of *Abbreviata* sp. are widespread in Australia; Jones (1995b) reported larvae in gastric tissues from snakes (Elapidae) and 5 lizard families

(Agamidae, Gekkonidae, Pygopodidae, Scincidae, and Varanidae).

The genus *Ctenotus* is diverse, with >70 described species (Cogger, 1992). Initial helminthological work with the genus *Ctenotus* indicates that known parasites are shared with hosts representing other families of reptiles. Examination of additional species will be required before helminth diversity and specificity can be evaluated for Australian reptiles.

Eric R. Pianka (University of Texas, Austin) and Robert L. Bezy (Natural History Museum of Los Angeles County) permitted the examination of *Ctenotus leonhardii* and *C. quattuordecimlineatus*. The identification of *Wanaristrongylus ctenoti* was made by Marie-Claude Durette-Desset (Muséum National d'Histoire Naturelle, Paris, France).

Literature Cited

- Adamson, M. L. 1981. *Parapharyngodon osteopili* n. sp. (Pharyngodonidae: Oxyuroidea) and a revision of *Parapharyngodon* and *Thelandros*. Systematic Parasitology 3:105–117.
- Baker, M. R. 1987. Synopsis of the Nematoda parasitic in amphibians and reptiles. Memorial University of Newfoundland Occasional Papers in Biology 11:1–325.
- Bush, A. O., K. D. Lafferty, J. M. Lotz, and A. W. Shostak. 1997. Parasitology meets ecology on its own terms: Margolis et al. revisited. Journal of Parasitology 83:575–583.
- Cogger, H. G. 1992. Reptiles & Amphibians of Australia. Reed Books, Chatswood, New South Wales. 775 pp.
- Goldberg, S. R., and C. R. Bursey. 1991. *Parapharyngodon kartana* in two skinks, *Emoia nigra* and *Emoia samoense* (Sauria: Scincidae), from Samoa.

Journal of the Helminthological Society of Washington 58:265–266.

- , and ———. 1995. Gastrointestinal nematodes of two Australian skinks, *Ctenotus regius* and *Ctenotus schomburgkii* (Sauria: Scincidae). Journal of the Helminthological Society of Washington 62:237–238.
- Jones, H. I. 1986. Gastrointestinal nematodes in the lizard genus *Pogona* Storr (Agamidae) in Western Australia. Australian Journal of Zoology 34:689–705.
- . 1987. *Wanaristrongylus* gen. n. (Nematoda: Trichostrongyloidea) from Australian lizards, with descriptions of three new species. Proceedings of the Helminthological Society of Washington 54: 40–47.
- . 1995a. Gastric nematode communities in lizards from the Great Victoria Desert, and an hypothesis for their evolution. Australian Journal of Zoology 43:141–164.
- . 1995b. Pathology associated with physalopterid larvae (Nematoda: Spirurida) in the gastric tissues of Australian reptiles. Journal of Wildlife Diseases 31:299–306.
- Mawson, P. M. 1972. The nematode genus *Maxvachonia* (Oxyurata: Cosmocercidae) in Australian reptiles and frogs. Transactions of the Royal Society of South Australia 96:101–108.
- Pianka, E. R. 1969. Sympatry of desert lizards (*Ctenotus*) in Western Australia. Ecology 50:1012–1030.

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Research Note

Presence of *Eustrongylides* sp. (Jägerskiöld, 1909) (Nematoda: Dioctophymatoidea) in *Galaxias maculatus* (Jenyns, 1842) (Pisces: Galaxiidae) from Patagonia, Argentina

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ABSTRACT: During a study of the parasitofauna of *Galaxias maculatus* from Patagonia, Argentina, specimens with melanosis on the caudal peduncle were found. The melanosis was caused by encapsulation of an *Eustrongylides* sp. larva. By experimentation using chicks, a subadult with a poorly developed posterior end and a cephalic end similar to *E. tubifex* was obtained. This is the first report of *Eustrongylides* in fishes from Argentina and in *G. maculatus* from South America, including a new location and type of reaction.

KEY WORDS: *Eustrongylides* sp., *Galaxias maculatus*, melanosis, Argentina, Patagonia.

Eustrongylides sp. (Jägerskiöld, 1909) is a cosmopolitan genus, and its larva has been reported as parasitizing galaxiids from Australia (Johnston and Mawson, 1940) and *Galaxias maculatus* from New Zealand (Hine, 1978) and Australia (Pollard, 1974). Its life cycle includes an aquatic oligochaete, a fish, and a piscivorous bird. In the fish, the larva migrates from the di-

gestive tract to the cavity or musculature of the body wall (Measures, 1988 a, b, c).

Eustrongylidosis can reach epizootic proportions when the environment has been altered by anthropic action, allowing proliferation of aquatic oligochaetes (Spalding et al., 1993); for example, a high mortality of piscivorous birds due to *E. ignotus* has been reported in North America (Spalding and Forrester, 1993). Also, humans can acquire the parasite by eating raw or poorly cooked fish (Lichtenfels and Stroup, 1985).

During a survey of parasites of *G. maculatus* (Jenyns, 1842) in Patagonia, Argentina, monthly samples were taken at different depths (0 to 50 m) from Lake Gutiérrez (41°12'S, 71°26'W). This oligotrophic, nonpolluted lake is of glacial origin, with 112.2 m of maximum depth and water temperatures ranging from 6° to 16°C. A total of 1,669 *G. maculatus* specimens (33.7–61.3-mm length; \bar{X} = 44.5) were checked between 1994 and 1997.

Macroscopic observation revealed fish with swelling and a strongly melanized capsule at the caudal peduncle (Fig. 1). The capsules are 3.7

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